FINANCIAL ASSISTANCE
FUNDING OPPORTUNITY ANNOUNCEMENT

U. S. Department of Energy

National Energy Technology Laboratory

Solid-State Lighting Product Development Funding Opportunity – Round V

Funding Opportunity Number: DE-PS26-08NT00291

Announcement Type: Amendment 001

CFDA Number: 81.086

Issue Date: **05/12/2008**

Application Due Date: **07/16/2008 at 3:00:00 PM Eastern Time**

This announcement will remain open until the Application Due Date. Applications may be submitted any time before the announcement closes.

NOTE: NEW REQUIREMENTS FOR GRANTS.GOV

Where to Submit
Applications must be submitted through Grants.gov to be considered for award. You cannot submit an application through Grants.gov unless you are registered. Please read the registration requirements carefully and start the process immediately. Remember you have to update your CCR registration annually. If you have any questions about your registration, you should contact the Grants.gov Helpdesk at 1-800-518-4726 to verify that you are still registered in Grants.gov.

Registration Requirements
There are several one-time actions you must complete in order to submit an application through Grants.gov (e.g., obtain a Dun and Bradstreet Data Universal Numbering System (DUNS) number, register with the Central Contract Registry (CCR), register with the credential provider, and register with Grants.gov). See http://www.grants.gov/GetStarted. Use the Grants.gov Organization Registration Checklist at http://www.grants.gov/assets/OrganizationRegCheck.pdf to guide you through the process. Designating an E-Business Point of Contact (EBiz POC) and obtaining a special password called an MPIN are important steps in the CCR registration process. Applicants, who are not registered with CCR and Grants.gov, should allow at least 21 days to complete these requirements. It is suggested that the process be started as soon as possible.

IMPORTANT NOTICE TO POTENTIAL APPLICANTS: When you have completed the process, you should call the Grants.gov Helpdesk at 1-800-518-4726 to verify that you have completed the final step (i.e. Grants.gov registration).

Microsoft Vista and Office 2007 Compatibility
Grants.gov is currently incompatible with both the new Microsoft (MS) Vista Operating System and the new Microsoft (MS) Office 2007 versions of Word, Excel, and Power Point. In order to create and submit your application to Grants.gov, you must find a computer with a previous version Microsoft Operating System, such as Windows XP.

If you attach a file created using MS Office 2007, you will not get an error message when you submit the application, HOWEVER, your entire application will not be able to be processed or accepted at Grants.gov and will not reach DOE. Grants.gov can accept applications with attachments created in MS Office 2007 if the attachments are saved in the prior format. See the http://www.grants.gov/assets/Vista_and_office_07_Compatibility.pdf for detailed instructions on how to do this. A file created in MS Office 2007 can be identified by the "x" at the end of the file extension, for example "sample.docx" for a Word file. Contact Grants.gov at 1-800-518-4726 with any questions.

Questions
Questions relating to the registration process, system requirements, how an application form works, or the submittal process must be directed to Grants.gov at 1-800-518-4726 or support@grants.gov. Part VII of this announcement explains how to submit other questions to the U.S. Department of Energy (DOE).

Application Receipt Notices
After an application is submitted, the Authorized Organization Representative (AOR) will receive a series of five e-mails. It is extremely important that the AOR watch for and save each of the emails. It may take up to two (2) business days from application submission to receipt of email Number 2.

When the AOR receives e-mail Number 5, it is their responsibility to follow the instructions in the e-mail to logon to IIPS and verify that their application was received by DOE. The titles of the five e-mails are:

Number 1 – Grants.gov Submission Receipt Number
Number 2 – Grants.gov Submission Validation Receipt for Application Number
Number 3 – Grants.gov Grantor Agency Retrieval Receipt for Application Number
Number 4 – Grants.gov Agency Tracking Number Assignment for Application Number
Number 5 – DOE e-Center Grant Application Received

The last email will contain instructions for the AOR to register with the DOE e-Center. If the AOR is already registered with the DOE e-Center, the title of the last email changes to:

Number 5 – DOE e-Center Grant Application Received and Matched

This email will contain the direct link to the application in IIPS. The AOR will need to enter their DOE e-Center user id and password to access the application.

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PART I – FUNDING OPPORTUNITY DESCRIPTION

A. SUMMARY

The Department of Energy (DOE), National Energy Technology Laboratory (NETL), on behalf of the Office of Energy Efficiency and Renewable Energy's (EERE's) Building Technologies (BT) Program, is seeking applications for applied research in the Solid-State Lighting (SSL) Product Development Program.

DOE has set aggressive and ambitious goals for SSL Research and Development (R&D): By 2025, to develop advanced solid-state lighting technologies that compared to conventional lighting technologies, are much more energy efficient, longer lasting, and cost-competitive by targeting a product system efficiency of 50 percent with lighting that accurately reproduces the sunlight spectrum. The focus of this Funding Opportunity Announcement (FOA), herein referred to as Announcement, is to support the development of SSL general illumination products that represent the state of the art in SSL performance. By providing significant financial resources through this FOA, DOE is seeking to reduce the level of technical risk that may impede product development in SSL. In return, DOE benefits by the earlier availability of energy efficient general lighting products that can reduce energy consumption for lighting nationwide. This announcement is a follow-up to the "Solid-State Lighting Core Technologies" FOA released on May 5, 2008.

B. BACKGROUND INFORMATION

The lighting industry is nearly 100 years old and is often characterized as a mature industry. DOE's BT Program selected lighting as one of the principle target markets for the development of more efficient technologies since it represents one-fifth of the national electrical consumption. DOE has provided assistance over the past several years with significant effort invested by industry, academia and Government; the prevailing theme that has surfaced repeatedly is that the promise of solid-state lighting will only be produced through a focused and concentrated effort between the stakeholders.

In 2005, lighting product sales in the U.S. totaled approximately $13.0 billion annually. Of this, approximately $2.45 billion was associated with lamps while the remaining sales were divided between fixtures, components (including ballasts and controls) and associated services such as design and maintenance. Sales of highbrightness (HB) LEDs, the technology associated with LEDs for lighting applications, were $4.7 billion in 2007. Of these HB LED revenues, approximately 7%, or $330 million was attributable to illumination applications.

To advance energy conservation in lighting in U.S. Buildings, DOE's BT Program maintains a Lighting Research and Development (LR&D) activity. Key to the objectives of this activity is its mission statement, "To increase end-use efficiency in buildings by aggressively researching new and evolving lighting technologies, in close collaboration with partners, to develop viable methodologies that have the technical potential to conserve 50% of electric lighting consumption by 2025".

To ensure that its research portfolio meets critical and evolving needs in a timely fashion, the LR&D activity has hosted and continues to host industry-led efforts to develop and maintain a series of technology road maps for the various technologies that comprise the lighting business. While not the only lighting technology of interest within the BT Program portfolio, SSL is the singular focus of this Announcement.

The SSL portfolio has developed a specific statement of objectives tailored to the aggressive needs suitable for general illumination applications. It targets aggressive performance goals that, if met and successfully deployed into the marketplace, will achieve the energy conservation goals of the LR&D program while meeting or exceeding the performance attributes of electric light that allows for direct comparison to natural sunlight spectra.

DOE envisions an LR&D Program that works together with the SSL industry to meet the program's goal by the year 2025. Critical to this LR&D Program are seven important aspects:

- Emphasize Competition
- Cost (and Risk) Sharing
- Partners Involved in Planning and Funding
- Targeted Research for Focused Need
- Innovative Intellectual Property Provisions
- Open Information and Process
- Success Determined by Milestones Met and Ultimately Energy Efficient, Long-life and Cost-Competitive Products Developed

The DOE SSL program has been granted an exceptional circumstances determination under the Bayh-Dole Act. The exceptional circumstances determination is intended to stimulate commercial utilization of new inventions developed in the DOE SSL Program. For cooperative agreements resulting from this Funding Opportunity Announcement, the Exceptional Circumstances Determination imposes a United States manufacture requirement. Specifically, the Determination requires that any entity having the right to use or sell any subject invention under one of the cooperative agreements in the United States and/or any other country -including the product developer--must agree that any products embodying the subject invention or produced through the use of the subject invention will be substantially manufactured in the United States. Any waiver of this requirement must be approved in writing by the Department of Energy in advance of foreign manufacture. The provision for licensing of patents generated in the award to members of the Next Generation Lighting Industry Alliance (NGLIA) only applies to Core Technology awards and does not apply to Product Development awards. More detailed information about the Exceptional Circumstances Determination can be found at:

http://www.netl.doe.gov/ssl/PDFs/SSL%20Determination%20-%20Signed%20June%202005_1.pdf.

C. FUNDING OPPORTUNITY OBJECTIVES

The objective of this Announcement is product development of general illumination SSL sources, luminaires, and enabling products. The specific Program Areas of Interest are given in the following section. Product development is the systematic use of knowledge gained from basic and applied research to develop or improve commercially viable materials, devices, or systems. Technical activities are focused on a targeted market application with fully defined price, efficacy, and other performance parameters necessary for success of the proposed product. Product development encompasses the technical activities of product concept modeling through the development of test models and field ready prototypes. In some cases, product development may include "focused-short-term" applied research, but its relevance to a specific product must be clearly identified. Like previous FOA's in the SSL series, this Announcement seeks to advance and promote the collaborative atmosphere of the LR&D SSL Program to identify potential product concepts; and incorporate into product supportive technologies that are novel or that fill technology voids or that otherwise represent a technological advancement of SSL Products.

This Funding Opportunity Announcement (FOA) contains multiple Program Areas of Interest, shown below. Applicants are cautioned that this FOA (DE-PS26-08NT00291) is a master announcement and that each Program Area of Interest has its own specific number for submission of applicants, (i.e. DE-PS26-08NT00291-01, DE-PS26-08NT00291-02, etc.).

NOTE: APPLICATIONS CANNOT BE SUBMITTED UNDER THE MASTER ANNOUNCEMENT (DE-PS26-08NT00291).

You may submit more than one application, however applicants must select and target only one (1) area of interest per application. Each application must have its own unique title. Applicants should note that if you intend to apply under more than one area of interest, you must download an application package specifically from each area of interest.

Applicants must submit their application under the Program Area of Interest that they feel best fits the majority of the effort to be performed. If DOE believes an application fits more appropriately in a Program Area of Interest other than the one to which it was submitted, DOE will either consider the application under the more appropriate Area of Interest or will direct the Applicant to resubmit to the appropriate Area of Interest. Do not submit identical applications under more than one Program Area of Interest.

D. PROGRAM AREAS OF INTEREST

The Program Areas of Interest for this Announcement were developed based on input from the 2007 Solid-State Lighting Workshop and on the status of current Product Development projects within the DOE SSL project portfolio. Each Program Area of Interest corresponds to one or more research subtasks identified in the DOE SSL Multi-year Program Plan (MYPP). The DOE SSL MYPP can be found at: www.netl.doe.gov/ssl/PDFs/SSLMYPP2008_web.pdf . (Note: While the Determination of Exceptional Circumstances does apply to Product Development Awards with respect to substantial manufacturing in the US, the provision for licensing of patents generated in the award to members of the NGLIA does not apply to Product Development Awards. Please see the full text of the Determination of Exceptional Circumstances for further information.)

Program Area of Interest 1: LED Based Integrated Luminaire

(DE-PS26-08NT00291-01)

Under Program Area of Interest 1, DOE is seeking applications to support the development of Light Emitting Diode (LED) based luminaires for general illumination. These luminaires must be designed to incorporate the advantages of LEDs: small size, higher source efficacy, inherently dimmable, and capable of being powered from a common power supply. At the same time, it is expected that the proposed luminaire designs will seek to overcome the challenges of using LEDs for general lighting applications:

- Thermal management
- Optical coupling
- Power supply efficiency and electrical design
- Reliability characterization

Novel solutions or significant improvements to one or more of these critical aspects are preferred. Proposed lighting fixtures must primarily focus on maintaining the efficiency advantages of the LED source while being acceptable to the consumer. Fixture designs proposed to this Program Area of Interest can be replacement products for existing lighting form factors as well as novel form factors favorable to the LED technology. Applicants should identify the environment for their products with appropriate specifications for the environment; i.e. luminous flux, viewing angle, etc. Additionally, it is anticipated that applicants will estimate the luminaire efficacy for their proposed product. The proposed luminaire in normal steady state operation should not degrade the manufacturer-specified (25ºC, pulsed) LED chip efficacy by more than 35%. The expected products to be developed in this Program Area of Interest are fully integrated, high efficiency, general illumination luminaires that use the highest efficiency LEDs available. Applicants to this Program Area of Interest are encouraged to match or exceed the performance projections in the 2008 DOE SSL MYPP (p. 66) and improve upon the best

products currently available on the market while being acceptable to the consumer. (MYPP subtasks 2.2.3, 2.3.1, 2.3.4, and 2.3.6)

Program Area of Interest 2: **High Efficiency LEDs or Arrays**

(DE-PS26-08NT00291-02)

Under Program Area of Interest 2, DOE is seeking to fund development of high efficiency, high flux LED devices, arrays, or modules possibly incorporating multiple LEDs to be used for general illumination. DOE would like to improve LED efficacy through advancements in extraction efficiency, internal quantum efficiency, current injection efficiency, improved thermal performance, and phosphor system efficiency on production devices. The expected products to be developed in this Program Area of Interest are higher efficacy white LEDs or LED arrays compatible with the requirements for general illumination. Applicants to this Program Area of Interest are encouraged to relate their technical progress and milestones to the LED performance projections in the 2008 DOE SSL MYPP (p. 63). (MYPP subtasks 2.1.2, 2.1.3, 2.2.1, and 2.2.2)

Program Area of Interest 3: **Phosphors or Encapsulants**

(DE-PS26-08NT00291-03)

Under Program Area of Interest 3, DOE is seeking the development of phosphor and encapsulant materials for use with high brightness LED lighting systems. Phosphor systems with a broad visible emission spectrum pumped by blue or UV sources with improved quantum yield, thermal quenching properties, and optical system efficiency are sought to improve the efficiency of high color rendering phosphor converted LED products. Also being sought are, long lifetime, high index of refraction encapsulation materials for LEDs to improve the light extraction efficiency of high brightness LEDs. Materials developed under this Program Area of Interest must be compatible with state of the art, high brightness LED structures. Applicants to this Program Area of Interest will be required to demonstrate the performance of their products in demonstration LEDs which will be delivered to DOE for evaluation and are encouraged to relate their technical objectives to the subtasks metrics in the MYPP (p. 77) and compare the projected LED performance using their technology to the LED performance projections in the 2008 MYPP (p. 63). (MYPP subtask 2.2.1)

Program Area of Interest 4: **Electronics Development**

(DE-PS26-08NT00291-004)

Under Program Area of Interest 4, DOE is seeking the development of integrated modular power supplies and current drivers for driving high brightness LEDs in general illumination applications. It is expected that these power supply/current drivers will be efficient (>85%), have good power factor (>0.90), be compact in size, low cost, and reliable (>50,000 hours) at temperatures typical in LED lighting applications. Compatibility with efficient dimmable lighting controls is also highly preferred. Applicants are encouraged to relate their technical progress against the subtask metrics in the 2008 MYPP (p. 78). (MYPP subtask 2.2.3)

Program Area of Interest 5: **Organic Light Emitting Diode (OLED) Lighting Panel**

(DE-PS26-08NT00291-05)

Under Program Area of Interest 5, DOE is seeking to support the development of a fully integrated OLED lighting product. This product must be designed to incorporate the advantages of using OLEDs for lighting: rapidly improving efficacy, low brightness emission which reduces the need for luminaire optics, excellent color rendering, and the possibility of a variety of form factors. It is recommended that

the proposed product will address the following key areas for enabling a feasible OLED product:

- Efficacy
- Lifetime
- Manufacturability
- Power supply and electrical design

Novel solutions or significant improvements to one or more of these critical aspects are preferred. It is expected that the proposed lighting panel exhibit good efficacy (comparable to the OLED performance projection in the DOE SSL MYPP, p. 67), long lifetime (>5000 hrs), good color rendering (>85CRI), and a luminous flux appropriate for the stated general illumination application which is a sizable market that has the potential for significant energy conservation. Applicants should identify the environment for their products with appropriate specifications for the environment; i.e. luminous flux, viewing angle, etc. It is anticipated that all of these specifications will be achieved while maintaining the ability for low cost manufacturing. The OLED product should be entirely self-contained including power supply and any necessary luminaire. Awarded projects will be required to provide five (5) prototype luminaires to DOE for evaluation at the conclusion of the project. (MYPP subtasks 4.1.2, 4.2.1, 4.2.2, 4.3.1, and 4.4.1)

Program Area of Interest 6: **Low cost substrates and encapsulation for OLEDs**

(DE-PS26-08NT00291-06)

Under Program Area of Interest 6, DOE seeks the development of low cost substrates and/or encapsulation materials suitable for use with high efficacy, low cost OLEDs. The proposed research must focus on substrate/encapsulation materials and fabrication methods that advance state of the art OLED performance toward the 2015 DOE SSL Program targets (given in parentheses) in one or more of the following areas:

- Long lifetime operation (40,000 hours)
- Extraction efficiency (90%)
- Optical transparency (equal to high quality glass)
- Thermal management (Thermal resistance – junction to case C/W)

Cost analysis of the substrate/encapsulation technology should be performed to demonstrate the feasibility of the proposed technology and demonstrate a path towards DOE goals for encapsulation and substrate costs of less than $\$3/m^2$. Materials developed under this Program Area of Interest must be compatible with state of the art OLED structures and applicants to this Program Area of Interest will be required to verify the performance of their products in prototype OLEDs, which will be delivered to DOE for evaluation. Applicants are encouraged to relate their technical objectives to the subtasks metrics in the MYPP (p. 83). (MYPP subtasks 4.1.1 and 4.3.1)

Program Area of Interest 7: **Off-Grid SSL Products**

(DE-PS26-08NT00291-07)

SSL devices have made a significant penetration into many product areas including general illumination applications. The unique, low voltage power requirements of these devices is an ideal match to leading photovoltaic (PV) devices that have exhibited similar advancements in market penetration and use. Combining these two leading emerging technologies to create useful products that do not use electric power supplied by the U.S. electric grid represents an ideal way to conserve power or to use these devices where grid power is simply not available or is of uncertain reliability. Even illumination devices that are not of sufficient efficiency to be considered for routine use in U.S. buildings may serve the energy conservation goals of DOE by providing service that is completely removed from the grid. While many useful products have already been introduced and are in fact, used daily (i.e., architectural and walkway lighting), there is ample room for new, imaginative product ideas that remove loads from the

grid by shifting power requirements to a renewable source. Applications for novel products that use a combination of SSL, PV and batteries are sought under this Program Area of Interest. Product applications may include architectural façade lighting, remote outdoor lighting, marine applications, security illumination, emergency or portable lighting, or any other niche application that takes advantage of the unique properties of any or all of these emerging technologies. Applications that provide novel designs of practical devices that use Commercial Off-The Shelf (COTS) technology for the SSL source, photovoltaic collection system, batteries and controls are sought under this Program Area of Interest. The proposed devices should be cost competitive with the designs they replace and life cycle cost comparisons are required.

PART II – AWARD INFORMATION

A. TYPE OF AWARD INSTRUMENT
DOE anticipates awarding cooperative agreements under this program announcement (See Section VI.B.2 Statement of Substantial Involvement).

B. ESTIMATED FUNDING
Approximately $7,500,000 is expected to be available for new awards under this announcement.

C. MAXIMUM AND MINIMUM AWARD SIZE
Ceiling (i.e., the maximum amount for an individual award made under this announcement):
$ None

Floor (i.e., the minimum amount for an individual award made under this announcement):
$ None

D. EXPECTED NUMBER OF AWARDS
DOE anticipates 2-5 awards under this announcement depending on the size of the awards.

E. ANTICIPATED AWARD SIZE
DOE anticipates that awards will not exceed $900,000 (total DOE Share per award) per year for up to two (2) years for program areas of interest 1 through 6.
DOE anticipates that awards will not exceed $400,000 (total DOE Share per award) per year for up to two (2) years for Program Area of Interest 7.

F. PERIOD OF PERFORMANCE
DOE anticipates making awards that will run for up to two (2) years.

G. TYPE OF APPLICATION
DOE will accept new and renewal applications under this announcement.

PART III - ELIGIBILITY INFORMATION

A. ELIGIBLE APPLICANTS

All types of domestic entities are eligible to apply, except other Federal agencies, Federally Funded Research and Development Center (FFRDC) Contractors, and nonprofit organizations described in section 501(c)(4) of the Internal Revenue Code of 1986 that engaged in lobbying activities after December 31, 1995.

B. COST SHARING

The cost share must be at least 20% of the total allowable costs of the project (i.e., the sum of the Government share, including FFRDC contractor costs if applicable, and the recipient share of allowable costs equals the total allowable costs of the projects) and must come from non-Federal sources unless otherwise allowed by law.

C. OTHER ELIGIBILITY REQUIREMENTS

Federally Funded Research and Development Center (FFRDC) Contractors.
FFRDC contractors are not eligible for an award under this announcement, but they may be proposed as a team member on another entity's application subject to the following guidelines:

Authorization for non-DOE/NNSA FFRDCs. The Federal agency sponsoring the FFRDC contractor must authorize in writing the use of the FFRDC contractor on the proposed project and this authorization must be submitted with the application. The use of a FFRDC contractor must be consistent with the contractor's authority under its award and must not place the FFRDC contractor in direct competition with the private sector.

Authorization for DOE/NNSA FFRDCs. The cognizant contracting officer for the FFRDC must authorize in writing the use of a DOE/NNSA FFRDC contractor on the proposed project and this authorization must be submitted with the application. The following wording is acceptable for this authorization.

> "Authorization is granted for the _____ Laboratory to participate in the proposed project. The work proposed for the laboratory is consistent with or complimentary to the missions of the laboratory, will not adversely impact execution of the DOE/NNSA assigned programs at the laboratory, and will not place the laboratory in direct competition with the domestic private sector."

Value/Funding. The value of, and funding for, the FFRDC contractor portion of the work will not normally be included in the award to a successful applicant. Usually, DOE/NNSA will fund a DOE/NNSA FFRDC contractor through the DOE field work proposal system and other FFRDC contractors through an interagency agreement with the sponsoring agency.

Cost Share. The applicant's cost share requirement will be based on the total cost of the project, including the applicant's and the FFRDC contractor's portions of the effort.

FFRDC Contractor Effort:
The FFRDC contractor effort, in aggregate, shall not exceed 20% of the total estimated cost of the project, including the applicant's and the FFRDC contractor's portions of the effort.

Responsibility. The applicant, if successful, will be the responsible authority regarding the settlement and satisfaction of all contractual and administrative issues, including but not limited to, disputes and claims arising out of any agreement between the applicant and the FFRDC contractor.

PART IV – APPLICATION AND SUBMISSION INFORMATION

A. ADDRESS TO REQUEST APPLICATION PACKAGE

Application forms and instructions are available at Grants.gov. To access these materials, go to http://www.grants.gov, select "Apply for Grants," and then select "Download Application Package." Enter the CFDA and/or the funding opportunity number located on the cover of this announcement and then follow the prompts to download the application package.

B. LETTER OF INTENT AND PRE-APPLICATION

1. Letter of Intent.
Letters of Intent are not required.

2. Pre-application
Pre-applications are not required.

C. CONTENT AND FORM OF APPLICATION – 424 (R&R)

You must complete the mandatory forms and any applicable optional forms (e.g., Disclosure of Lobbying Activities (SF-LLL)) in accordance with the instructions on the forms and the additional instructions below. Files that are attached to the forms must be in Adobe Portable Document Format (PDF) unless otherwise specified in this announcement.

1. **SF 424 (R&R)** Complete this form first to populate data in other forms. Complete all the required fields in accordance with the pop-up instructions on the form. To activate the instructions, turn on the "Help Mode" (Icon with the pointer and question mark at the top of the form). The list of certifications and assurances referenced in Field 18 can be found on the DOE Financial Assistance Forms Page at http://management.energy.gov/business_doe/business_forms.htm under Certification and Assurances.

2. **RESEARCH AND RELATED Other Project Information**
Complete questions 1 through 5 and attach files. The files must comply with the following instructions:

Project Summary/Abstract (Field 6 on the Form)
The project summary/abstract must contain a summary of the proposed activity suitable for dissemination to the public. It should be a self-contained document that identifies the name of the applicant, the project director/principal investigator(s), the project title, the objectives of the project, a description of the project, including methods to be employed, the potential impact of the project (i.e., benefits, outcomes), and major participants (for collaborative projects). This document must not include any proprietary or sensitive business information as the Department may make it available to the public. The project summary must not exceed 1 page when printed using standard 8.5" by 11" paper with 1" margins (top, bottom, left and right) with font not smaller than 11 point. To attach a Project Summary/Abstract, click "Add Attachment."

Project Narrative (Field 7 on the Form)
The project narrative must not exceed 25 pages, including cover page, table of contents, charts, graphs, maps, photographs, and other pictorial presentations, when printed using standard 8.5" by 11" paper with 1 inch margins (top, bottom, left, and right). **EVALUATORS WILL ONLY REVIEW THE NUMBER OF PAGES SPECIFIED IN THE PRECEDING SENTENCE.** The font must not be smaller than 11 point. Do not include any Internet addresses (URLs) that provide information necessary to review the application, because the information contained in these sites will not be reviewed. See Part VIII.D for instructions on how to mark proprietary

application information. To attach a Project Narrative, click “Add Attachment.”

The project narrative must include:

Project Objectives: This section should provide a clear, concise statement of the specific objectives/aims of the proposed project.

Merit Review Criterion Discussion The section should be formatted to address each of the merit review criterion and sub-criterion listed in Part V.A. Provide sufficient information so that reviewers will be able to evaluate the application in accordance with these merit review criteria. DOE WILL EVALUATE AND CONSIDER ONLY THOSE APPLICATIONS THAT ADDRESS SEPARATELY EACH OF THE MERIT REVIEW CRITERION AND SUB-CRITERION.

Statement Of Project Objectives (SOPO):
The Department of Energy's, National Energy Technology Laboratory uses a specific format for Statement of Project Objectives in its awards. In announcements such as this one, where the Government does not provide a Statement of Project Objectives, the Applicant is to provide one, which the DOE will then use to generate the Statement of Project Objectives to be included in the award.

The project narrative must contain a single, detailed Statement of Project Objectives that addresses how the project objectives will be met. The Statement of Project Objectives must contain a clear, concise description of all activities to be completed during project performance and follow the structure discussed below. The Statement of Project Objectives may be released to the public by DOE in whole or in part at any time. It is therefore required that it shall not contain proprietary or confidential business information.

The Statement of Project Objectives is generally less than 3-4 pages in total for the proposed work. Applicants shall prepare the Statement of Project Objectives in the following format:

TITLE OF WORK TO BE PERFORMED
(Insert the title of work to be performed. Be concise and descriptive.)

A. OBJECTIVES
Include one paragraph on the overall objective(s) of the work. Also, include objective(s) for each phase of the work.

B. SCOPE OF WORK
This section should not exceed one-half page and should summarize the effort and approach to achieve the objective(s) of the work for each Phase.

C. TASKS TO BE PERFORMED
Tasks, concisely written, should be provided in a logical sequence and should be divided into the phases of the project, as appropriate. This section provides a brief summary of the planned approach to this project.

PHASE I

Task 1.0 – (Title)
(Description)
Subtask 1.1 (Optional)
(Description)
Task 2.0 - (Title)

PHASE II (Optional)
Task 3.0 - (Title)

D. MILESTONES AND SUCCESS CRITERIA

As a part of the approved SOPO, the Recipient shall propose Milestones that will serve as the baseline for tracking performance of the project and will identify success criteria associated with the milestones. Milestones are incremental achievements that need to occur to accomplish a goal. Success Criteria are meant to define project goals for each interval of the proposed effort. Success Criteria are intended to objectively determine whether or not a project has been successful. These success criteria and milestones shall relate to the determination of technical "merit" as described in Criterion 1 and shall be relevant to the MYPP goals. The success criteria will be taken into consideration when making a continuation determination at each decision point.

During project performance, the Recipient will report the Milestone Status as relates to the Success Criteria. The Milestone and Success Criteria Status will present and include:

(1) the actual status and progress of the project,
(2) specific progress made toward achieving the project's Success Criteria, and,
(3) any proposed changes in the projects schedule required to complete critical path milestones.

E. DELIVERABLES

The periodic, topical, and final reports shall be submitted in accordance with the attached "Federal Assistance Reporting Checklist" and the instructions accompanying the checklist.

Note: The Recipient shall provide a list of deliverables other than those identified on the "Federal Assistance Reporting Checklist" that will be delivered. These reports shall also be identified within the text of the Statement of Project Objectives. See the following examples:

1. Task 1.1 - (Report Description)

2. Task 2.2 - (Report Description)

F. BRIEFINGS/TECHNICAL PRESENTATIONS (If applicable)

The Recipient shall prepare detailed briefings for presentation to the Project Officer at the Project Officer's facility located in Pittsburgh, PA or Morgantown, WV. Briefings shall be given by the Recipient to explain the plans, progress, and results of the technical effort.

The Recipient shall provide and present a technical paper(s) at the DOE/NETL Annual SSL R&D Workshop, at a location to be determined.

The Recipient shall provide and present a technical paper(s) at the DOE/NETL Peer Review Meeting to be held at DOE Headquarters in Washington D.C.; or other location specified by the DOE Project Officer.

(END OF STATEMENT OF PROJECT OBJECTIVES)

Project Performance Site:

Indicate the primary site where the work will be performed. If a portion of the work will be performed at any other sites, identify those sites, also.

Biographical Sketch Appendix***:***
Provide a biographical sketch for the project director/principal investigator (PD/PI) and each senior/key person listed in Section A on the R&R Budget form. Provide the biographical sketch information as an appendix to your project narrative. Do not attach a separate file. The biographical sketch appendix will not count in the project narrative page limitation. The biographical information for each person must not exceed 2 pages when printed on 8.5" by 11" paper with 1 inch margins (top, bottom, left, and right) with font not smaller than 11 point and must include:

Education and Training:
Undergraduate, graduate and postdoctoral training, provide institution, major/area, degree, and year.

Research and Professional Experience:
Beginning with the current position list, in chronological order, professional/academic positions with a brief description.

Publications:
Provide a list of up to 10 publications most closely related to the proposed project. For each publication, identify the names of all authors (in the same sequence in which they appear in the publication), the article title, book or journal title, volume number, page numbers, year of publication, and website address if available electronically.

Patents, copyrights, and software systems developed may be provided in addition to or substituted for publications.

Synergistic Activities: List no more than 5 professional and scholarly activities related to the effort proposed.

Bibliography & References Cited Appendix: Provide a bibliography of any references cited in the Project Narrative. Each reference must include the names of all authors (in the same sequence in which they appear in the publication), the article and journal title, book title, volume number, page numbers, and year of publication. Include only bibliographic citations. Applicants should be especially careful to follow scholarly practices in providing citations for source materials relied upon when preparing any section of the application. In order to reduce the number of files attached to your application, please provide the Bibliography and References Cited information as an appendix to your project narrative. Do not attach a file in field 8. This appendix will not count in the project narrative page limitation.

Facilities & Other Resources Appendix: This information is used to assess the capability of the organizational resources, including subawardee resources, available to perform the effort proposed. Identify the facilities to be used (Laboratory, Animal, Computer, Office, Clinical, and Other). If appropriate, indicate their capacities, pertinent capabilities, relative proximity, and extent of availability to the project. Describe only those resources that are directly applicable to the proposed work. Describe other resources available to the project (e.g., machine shop, electronic shop) and the extent to which they would be available to the project. In order to reduce the number of files attached to your application, please provide

the Facility and Other Resource information as an appendix to your project narrative. Do not attach a file in field 9. This appendix will not count in the project narrative page limitation.

Equipment Appendix: List major items of equipment already available for this project and, if appropriate identify location and pertinent capabilities. In order to reduce the number of files attached to your application, please provide the Equipment information as an appendix to your project narrative. Do not attach a file in field 10. This appendix will not count in the project narrative page limitation.

Other Attachments (Field 11 on the form): If you need to elaborate on your responses to questions 1-5 on the "Other Project Information" document, attach a file in field 11.

Also, attach the following file:

Commitment Letters from Third Parties Contributing to Cost Sharing
If a third party, (i.e., a party other than the organization submitting the application) proposes to provide all or part of the required cost sharing, the applicant must include a letter from the third party stating that it is committed to providing a specific minimum dollar amount of cost sharing. The letter should also identify the proposed cost sharing (e.g., cash, services, and/or property) to be contributed. Letters must be signed by the person authorized to commit the expenditure of funds by the entity and be provided in a PDF format. Save this information in a single file named "CLTP.pdf" and click on "Add Attachments" in Field 11 to attach.

Budget for DOE/NNSA Federally Funded Research and Development Center (FFRDC) Contractor, if applicable. If a DOE/NNSA FFRDC contractor is to perform a portion of the work, you must provide a DOE Field Work Proposal in accordance with the requirements in DOE Order 412.1 Work Authorization System. This order and the DOE Field Work Proposal form are available at http://management.energy.gov/business_doe/business_forms.htm. Use the FFRDC name as the file name (up to 10 letters) and attach to the R&R Other Project Information form in Field 11 – Add Attachments.

3. RESEARCH AND RELATED BUDGET (TOTAL FED + NON-FED)

Complete the Research and Related Budget (Total Fed & Non-Fed) form in accordance with the instructions on the form (Activate Help Mode to see instructions) and the following instructions. You must complete a separate budget for each year of support requested. The form will generate a cumulative budget for the total project period. You must complete all the mandatory information on the form before the NEXT PERIOD button is activated. You may request funds under any of the categories listed as long as the item and amount are necessary to perform the proposed work, meet all the criteria for allowability under the applicable Federal cost principles, and are not prohibited by the funding restrictions in this announcement (See PART IV. G).

Budget Justification (Field K on the form).
Provide the required supporting information for the following costs (See R&R instructions): equipment; domestic and foreign travel; participant/trainees; material and supplies; publication; consultant services; ADP/computer services; subaward/consortium/contractual; equipment or facility rental/user fees; alterations and renovations; and indirect cost type. Provide any other information you wish to submit to justify your budget request. If cost sharing is required, provide an explanation of the source, nature, amount, and availability of any proposed cost sharing. Attach a single budget justification file for the entire project

period in Field K. The file automatically carries over to each budget year.

4. **R&R SUBAWARD (Total Fed + Non-Fed) FORM**
Budgets for Subawardees, other than DOE FFRDC Contractors. You must provide a separate cumulative R&R budget for each subawardee that is expected to perform work estimated to be more than $100,000 or 50 percent of the total work effort (whichever is less). Download the R&R Budget Attachment from the R&R SUBAWARD BUDGET (Total Fed + Non-Fed) FORM and e-mail it to each subawardee that is required to submit a separate budget. After the Subawardee has e-mailed its completed budget back to you, attach it to one of the blocks provided on the form. Use up to 10 letters of the subawardee's name as the file name.

5. **Disclosure of Lobbying Activities (SF-LLL)**
If applicable, complete SF- LLL. Applicability: If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the grant/cooperative agreement, you must complete and submit Standard Form - LLL, "Disclosure Form to Report Lobbying."

Summary of Required Forms/Files

Your application must include the forms from the application package and other documents as shown below:

Name of Document	Format	Attach to
SF 424 (R&R)	Form	N/A
RESEARCH AND RELATED Other Project Information	Form	N/A
Project Summary/Abstract	PDF	Field 6
Project Narrative, including required appendices	PDF	Field 7
Commitment Letters from Third Parties	PDF	Field 11
Budget for DOE/NNSA FFRDC, if applicable	PDF	Field 11
RESEARCH AND RELATED BUDGET (Total Fed + Non-Fed)	Form	N/A
Budget Justification	PDF	Field K
R&R SUBAWARD BUDGET (Total Fed + Non-Fed) ATTACHMENT(S) FORM, if applicable	Form	N/A
SF-LLL Disclosure of Lobbying Activities, if applicable	Form	N/A

D. SUBMISSIONS FROM SUCCESSFUL APPLICANTS

If selected for award, DOE/NNSA reserves the right to request additional or clarifying information for any reason deemed necessary, including, but not limited to:

- Indirect cost information
- Other budget information
- Name and phone number of the Designated Responsible Employee for complying with national policies prohibiting discrimination (See 10 CFR 1040.5)
- Representation of Limited Rights Data and Restricted Software, if applicable
- Commitment Letter from Third Parties Contributing to Cost Sharing, if applicable
- Environmental Questionnaire

E. SUBMISSION DATES AND TIMES

1. Pre-application Due Date

Pre-applications are not required.

2. Application Due Date

Applications should be received by 07/16/2008, not later than 3:00 PM Eastern Time. You are encouraged to transmit your application well before the deadline. APPLICATIONS RECEIVED AFTER THE DEADLINE WILL NOT BE REVIEWED OR CONSIDERED FOR AWARD.

F. INTERGOVERNMENTAL REVIEW

This program is not subject to Executive Order 12372 – Intergovernmental Review of Federal Programs.

G. FUNDING RESTRICTIONS

Cost Principles Costs must be allowable in accordance with the applicable Federal cost principles referenced in 10 CFR part 600. The cost principles for commercial organization are in FAR Part 31.

Pre-award Costs Recipients may charge to an award resulting from this announcement pre-award costs that were incurred within the ninety (90) calendar day period immediately preceding the effective date of the award, if the costs are allowable in accordance with the applicable Federal cost principles referenced in 10 CFR part 600. Recipients must obtain the prior approval of the contracting officer for any pre-award costs that are for periods greater than this 90 day calendar period.

Pre-award costs are incurred at the applicant's risk. DOE is under no obligation to reimburse such costs if for any reason the applicant does not receive an award or if the award is made for a lesser amount than the applicant expected.

H. OTHER SUBMISSION AND REGISTRATION REQUIREMENTS

1. Where to Submit

APPLICATIONS MUST BE SUBMITTED THROUGH GRANTS.GOV TO BE CONSIDERED FOR AWARD. Submit electronic applications through the "Apply for Grants" function at www.Grants.gov. If you have problems completing the registration process or submitting your application, call Grants.gov at 1-800-518-4726 or send an email to support@grants.gov.

2. Registration Process

You must COMPLETE the one-time registration process (all steps) before you can submit your first application through Grants.gov (See www.grants.gov/GetStarted). **We recommend that you start this process at least three weeks before the application due date**. It may take 21 days or more to complete the entire process. Use the Grants.gov Organizational Registration Checklists at http://www.grants.gov/assets/OrganizationRegCheck.pdf to guide you through the process. IMPORTANT: During the CCR registration process, you will be asked to designate an E-Business Point of Contact (EBIZ POC). The EBIZ POC must obtain a special password called "Marketing Partner identification Number" (MPIN). When you have completed the process, you should call the Grants.gov Helpdesk at 1-800-518-4726 to verify that you have completed the final step (i.e., Grants.gov registration).

3. Application Receipt Notices

After an application is submitted, the Authorized Organization Representative (AOR) will receive a series of five e-mails. It is extremely important that the AOR watch for and save each of the emails. It may take up to two (2) business days from application submission to receipt of email Number 2. When the AOR receives email Number 5, it is their responsibility to follow the instructions in the email to logon to IIPS and verify that their application was received by DOE. You will need the Submission Receipt Number (email Number 1) to track a submission. The titles of the five e-mails are:

Number 1 - Grants.gov Submission Receipt Number
Number 2 - Grants.gov Submission Validation Receipt for Application Number
Number 3 - Grants.gov Grantor Agency Retrieval Receipt for Application Number
Number 4 - Grants.gov Agency Tracking Number Assignment for Application Number
Number 5 – DOE e-Center Grant Application Received

The last email will contain instructions for the AOR to register with the DOE e-Center. If the AOR is already registered with the DOE e-Center, the title of the last email changes to:

Number 5 – DOE e-Center Grant Application Received and Matched

This email will contain the direct link to the application in IIPS. The AOR will need to enter their DOE e-Center user id and password to access the application.

Part V - APPLICATION REVIEW INFORMATION

A. CRITERIA

1. Initial Review Criteria

Prior to a comprehensive merit evaluation, DOE will perform an initial review to determine that (1) the applicant is eligible for an award; (2) the information required by the announcement has been submitted; (3) all mandatory requirements are satisfied; and (4) the proposed project is responsive to the objectives of the funding opportunity announcement.

2. Merit Review Criteria

Applications submitted in response to this funding opportunity will be evaluated and scored in accordance with the criteria and weights listed below:

TECHNICAL MERIT (CRITERION 1)
WEIGHT: 40%

- Validity of the product's potential to fill the proposed need or problem identified in the Funding Opportunity Announcement Program Areas of Interest, ability to address key risks, and technical superiority over currently available products. Likelihood of technical success and realism of stated goals.
- Validity of the proposed approach, the likelihood to impact and have success in the marketplace, the scientific merit of the key technology issues addressed, and the proposed technical innovation and its relevance to the stated objectives.
- Clarity, reasonableness and applicability of proposed milestones and success criteria as related to MYPP goals for each interval of the proposed effort with special emphasis on the descriptive, qualitative and quantitative milestone aspects.
- Thoroughness and feasibility of the proposed Statement of Project Objectives (SOPO) and the anticipated outcomes and results.

APPLICANT AND PARTICIPANT ROLES AND CAPABILITIES (CRITERION 2)
WEIGHT: 20%

- Evidence of current corporate experience and success in similar projects which led to successful technology development and commercialization.
- Experience and availability of key personnel to complete the proposed project, including personnel involved in technical development and commercialization.
- Legitimacy of the proposed labor hours and categories proposed for the work plan. Description and explanation of any subcontracting effort.
- Adequacy (quality, availability and appropriateness) of facilities and equipment to accommodate the proposed project.

INDUSTRIAL INVOLVEMENT AND COMMERCIALIZATION POTENTIAL (CRITERION 3)
WEIGHT: 20%

- Soundness of the commercialization strategy for the proposed product. Evidence, such as commitment letters, that show involvement from business sectors and/or institutional alliances and the ability to execute the commercialization strategy.
- Demonstrated viability and practicality of the proposed product to meet the needs of the target market in a cost effective manner without major market restructuring

considering potential technical, regulatory, economic, environmental, production or other issues impacting market success. Explanation of any variation from the performance and/or price projections outlined in the Announcement.
- Degree to which the proposed technology or product will be substantially manufactured in the United States.

ENERGY, ENVIRONMENTAL, AND ECONOMIC BENEFITS (CRITERION 4)
WEIGHT: 20%

- Legitimacy and impact of the energy benefits calculated using the "Guide for Evaluation of EnergySavings Potential – Solid-State Lighting Research and Development" (contained in Appendix A of this announcement).
- Legitimacy and impact of the environmental benefits which include, but are not limited to: Reduced global warming potential, increased protection of the stratospheric ozone layer, lower direct releases of water, air and ground pollutants, improved indoor air quality, improved recyclability, beneficial human health impacts and potential reductions in emissions of carbon dioxide from the proposed technology according to the guidelines (contained in Appendix A of this announcement).
- Legitimacy and impact of the economic benefits as it pertains to the market potential for the proposed technology.

3. Other Selection Factors

The selection official will consider the following program policy factors in the selection process:

1. It may be desirable to select for award a group of projects which represents a diversity of technical approaches and methods;
2. It may be desirable to support complementary and/or duplicative efforts or projects, which, when taken together, will best achieve the research goals and objectives;
3. It may be desirable to select different kinds and sizes of organizations in order to provide a balanced programmatic effort and a variety of different technical perspectives;
4. It may be desirable to select project(s) of less technical merit than other project(s) if such a selection will optimize use of available funds by allowing more projects to be supported and not be detrimental to the overall objectives of the program.
5. It may be desirable to select project(s) that reduce Federal investment and maximize corporate commitment as demonstrated by cost share levels that exceed the required 20%.

The above factors will be independently considered by the Selection Official in determining the optimum mix of applications that will be selected for support. These policy factors will provide the Selection Official with the capability of developing, from the competitive funding opportunity, a broad involvement of organizations and organizational ideas, which will both enhance the overall technology research effort and upgrade the program content to meet the goals of DOE.

B. REVIEW AND SELECTION PROCESS

1. Merit Review

Applications that pass the initial review will be subjected to a merit review in accordance with the guidance provided in the "Department of Energy Merit Review Guide for Financial Assistance." This guide is available under Financial Assistance, Regulations and Guidance at

http://www.management.energy.gov/documents/meritrev.pdf.

2. Selection

The Selection Official will consider the merit review recommendation, program policy factors, and the amount of funds available.

3. Discussions and Award

The Government may enter into discussions with a selected applicant for any reason deemed necessary, including but not limited to: (1) the budget is not appropriate or reasonable for the requirement; (2) only a portion of the application is selected for award; (3) the Government needs additional information to determine that the recipient is capable of complying with the requirements in 10 CFR part 600; and/or (4) special terms and conditions are required. Failure to resolve satisfactorily the issues identified by the Government will preclude award to the applicant.

C. ANTICIPATED NOTICE OF SELECTION AND AWARD DATES

DOE anticipates notifying applicants selected for award by December 31, 2008 and making awards by March 31, 2009.

Part VI - AWARD ADMINISTRATION INFORMATION

A. AWARD NOTICES

1. Notice of Selection

DOE will notify applicants selected for award. This notice of selection is not an authorization to begin performance. (See Part IV.G with respect to the allowability of pre-award costs.)

2. Notice of Award

A Notice of Financial Assistance Award issued by the contracting officer is the authorizing award document. It normally includes either as an attachment or by reference: (1). Special Terms and Conditions; (2). Applicable program regulations, if any; (3). Application as approved by DOE/NNSA.; (4). DOE assistance regulations at 10 CFR part 600, or, for Federal Demonstration Partnership (FDP) institutions, the FDP terms and conditions; (5). National Policy Assurances To Be Incorporated As Award Terms; (6). Budget Summary; and (7). Federal Assistance Reporting Checklist, which identifies the reporting requirements.

B. ADMINISTRATIVE AND NATIONAL POLICY REQUIREMENTS

1. Administrative Requirements

The administrative requirements for DOE grants and cooperative agreements are contained in 10 CFR part 600 (See: http://ecfr.gpoaccess.gov), except for grants and cooperative agreements made to Federal Demonstration Partnership (FDP) institutions. The FDP terms and conditions and DOE FDP agency specific terms and conditions are located on the National Science Foundation web site at http://www.nsf.gov/awards/managing/fed_dem_part.jsp.

2. Special Terms and Conditions and National Policy Requirements

The DOE Special Terms and Conditions for Use in Most Grants and Cooperative Agreements are located at http://management.energy.gov/business_doe/business_forms.htm.

The National Policy Assurances To Be Incorporated As Award Terms are located at DOE http://management.energy.gov/business_doe/business_forms.htm.

Intellectual Property Provisions

The standard DOE financial assistance intellectual property provisions applicable to the various types of recipients are located at http://www.gc.doe.gov/financial_assistance_awards.htm.

Statement of Substantial Involvement

There will be substantial involvement between the DOE and the Recipient during performance of the resultant cooperative agreements

RECIPIENT'S RESPONSIBILITIES. The Recipient is responsible for:

- Performing the activities supported by this award, including providing the required personnel, facilities, equipment, supplies and services;
- Defining approaches and plans, submitting the plans to DOE for review, and incorporating DOE comments;
- Managing and conducting the project activities;
- Providing all deliverables specified in the award in a timely basis;
- Participating in all briefings specified in the award Statement of Project Objectives;

- Submitting technical reports and incorporating DOE comments; and;
- Presenting the project results at appropriate technical conferences or meetings as specified by the DOE Project Officer.

DOE RESPONSIBILITIES. DOE is responsible for:

- Monitoring projects closely and may recommend alternative approaches to the work because of interrelationships with other projects with the SSL portfolio;
- Providing guidance for recipient's participation in the Annual SSL R&D Workshop. This workshop provides a forum for building partnerships and strategies to accelerate technology advances and guide market introduction of high efficiency, high-performance SSL products;
- Reviewing in a timely manner, technical reports and other deliverables and providing comments to the Recipient;
- Conducting program review meetings and peer reviews to ensure adequate progress and that the work accomplishes the program and project objectives;
- Promoting and facilitating technology transfer activities, including disseminating program results through presentations and publications, and communications with the building community and other research organizations through the Technical Information Network as well as ENERGY STAR® FOR SSL; and
- Serving as scientific/technical liaison and coordinating the close collaboration between participants and other program or industry staff.

C. REPORTING

Reporting requirements are identified on the Federal Assistance Reporting Checklist, DOE F 4600.2, attached to the award agreement. See the NETL Business Page at http://www.netl.doe.gov/business/forms/FederalAssistanceReportingChecklistExample.pdf for the proposed Checklist for this program**.**

PART VII - QUESTIONS/AGENCY CONTACTS

A. QUESTIONS

Questions regarding the content of the announcement must be submitted through the "Submit Question" feature of the DOE Industry Interactive Procurement System (IIPS) at http://e-center.doe.gov. Locate the program announcement on IIPS and then click on the "Submit Question" button. Enter required information. You will receive an electronic notification that your question has been answered. DOE/NNSA will try to respond to a question within 3 business days, unless a similar question and answer have already been posted on the website.

Questions relating to the registration process, system requirements, how an application form works, or the submittal process must be directed to Grants.gov at 1-800-518-4726 or support@grants.gov. DOE/NNSA cannot answer these questions.

B. AGENCY CONTACT

Name:	Kellyn Cassell
E-mail:	kellyn.cassell@netl.doe.gov
FAX:	(304) 285-4683
Telephone:	(304) 285-4554

PART VIII - OTHER INFORMATION

A. MODIFICATIONS

Notices of any modifications to this announcement will be posted on Grants.gov and the DOE Industry Interactive Procurement System (IIPS). You can receive an email when a modification or an announcement message is posted by joining the mailing list for this announcement through the link in IIPS. When you download the application at Grants.gov, you can also register to receive notifications of changes through Grants.gov.

B. GOVERNMENT RIGHT TO REJECT OR NEGOTIATE

DOE reserves the right, without qualification, to reject any or all applications received in response to this announcement and to select any application, in whole or in part, as a basis for negotiation and/or award.

C. COMMITMENT OF PUBLIC FUNDS

The Contracting Officer is the only individual who can make awards or commit the Government to the expenditure of public funds. A commitment by other than the Contracting Officer, either explicit or implied, is invalid.

D. PROPRIETARY APPLICATION INFORMATION

Patentable ideas, trade secrets, proprietary or confidentional commercial or financial information, disclosure of which may harm the applicant, should be included in an application only when such information is necessary to convey an understanding of the proposed project. The use and disclosure of such data may be restricted, provided the applicant includes the following legend on the first page of the project narrative and specifies the pages of the application which are to be restricted:

"The data contained in pages _____ of this application have been submitted in confidence and contain trade secrets or proprietary information, and such data shall be used or disclosed only for evaluation purposes, provided that if this applicant receives an award as a result of or in connection with the submission of this application, DOE shall have the right to use or disclose the data herein to the extent provided in the award. This restriction does not limit the government's right to use or disclose data obtained without restriction from any source, including the applicant."

To protect such data, each line or paragraph on the pages containing such data must be specifically identified and marked with a legend similar to the following:

"The following contains proprietary information that (name of applicant) requests not be released to persons outside the Government, except for purposes of review and evaluation."

E. EVALUATION AND ADMINISTRATION BY NON-FEDERAL PERSONNEL

In conducting the merit review evaluation, the Government may seek the advice of qualified non-Federal personnel as reviewers. The Government may also use non-Federal personnel to conduct routine, nondiscretionary administrative activities. The applicant, by submitting its application, consents to the use of non-Federal reviewers/administrators. Non-Federal reviewers must sign conflict of interest and non-disclosure agreements prior to reviewing an application. Non-Federal personnel conducting administrative activities must sign a non-disclosure agreement.

F. INTELLECTUAL PROPERTY DEVELOPED UNDER THIS PROGRAM

Patent Rights. The government will have certain statutory rights in an invention that is conceived or first actually reduced to practice under a DOE award. 42 U.S.C. 5908 provides that title to such inventions vests in the United States, except where 35 U.S.C. 202 provides otherwise for nonprofit organizations or small business firms. However, the Secretary of Energy may waive all or any part of the rights of the United States subject to certain conditions. (See "Notice of Right to Request Patent Waiver" in paragraph G below.)

Rights in Technical Data. Normally, the government has unlimited rights in technical data created under a DOE agreement. Delivery or third party licensing of proprietary software or data developed solely at private expense will not normally be required except as specifically negotiated in a particular agreement to satisfy DOE's own needs or to insure the commercialization of technology developed under a DOE agreement.

Special Protected Data Statutes. This program is covered by a special protected data statute. The provisions of the statute provide for the protection from public disclosure, for a period of up to 2 years from the development of the information, of data that would be trade secret, or commercial or financial information that is privileged or confidential, if the information had been obtained from a non-Federal party. Generally, the provision entitled, Rights in Data – Programs Covered Under Special Protected Data Statutes (10 CFR 600 Appendix A to Subpart D), would apply to an award made under this announcement. This provision will identify data or categories of data first produced in the performance of the award that will be made available to the public, notwithstanding the statutory authority to withhold data from public dissemination, and will also identify data that will be recognized by the parties as protected data.

G. NOTICE OF RIGHT TO REQUEST PATENT WAIVER

Applicants may request a waiver http://www.gc.doe.gov/documents/gc62_advance.pdf of all or any part of the rights of the United States in inventions conceived or first actually reduced to practice in performance of an agreement as a result of this announcement, in advance of or within 30 days after the effective date of the award. Even if such advance waiver is not requested or the request is denied, the recipient will have a continuing right under the award to request a waiver of the rights of the United States in identified inventions, i.e., individual inventions conceived or first actually reduced to practice in performance of the award. Any patent waiver that may be granted is subject to certain terms and conditions in 10 CFR 784 http://www.gc.doe.gov/documents/patwaivclau.pdf.

Domestic small businesses and domestic nonprofit organizations will receive the patent rights clause at 37 CFR 401.14, i.e., the implementation of the Bayh-Dole Act. This clause permits domestic small business and domestic nonprofit organizations to retain title to subject inventions. Therefore, small businesses and nonprofit organizations do not need to request a waiver.

H. NOTICE REGARDING ELIGIBLE/INELIGIBLE ACTIVITIES

Eligible activities under this program include those which describe and promote the understanding of scientific and technical aspects of specific energy technologies, but not those which encourage or support political activities such as the collection and dissemination of information related to potential, planned or pending legislation.

I. EXCEPTIONAL CIRCUMSTANCES

The Exceptional Circumstances Determination for the Solid-State Lighting Program (http://www.netl.doe.gov/ssl/PDFs/SSL%20Determination%20-%20Signed%20June%202005_1.pdf) imposes a United States manufacture requirement on the recipients of SSL Product Development cooperative agreements resulting from this Announcement. Specifically, the Determination requires that any entity having the right to use or sell any subject invention under one of the cooperative agreements in the United States and/or any other country -including the product developer--must agree that any products embodying the subject invention or produced through the use of the subject invention will be substantially manufactured in the United States. Any waiver of this requirement must be approved in writing by the Department of Energy in advance of foreign manufacture.

APPENDICES/REFERENCE MATERIAL

Appendix A – GUIDE FOR EVALUATION OF ENERGY SAVINGS POTENTIAL – SOLID-STATE LIGHTING RESEARCH AND DEVELOPMENT

GUIDE FOR EVALUATION OF ENERGY SAVINGS POTENTIAL

SOLID-STATE LIGHTING RESEARCH AND DEVELOPMENT

Office of Energy Efficiency and Renewable Energy

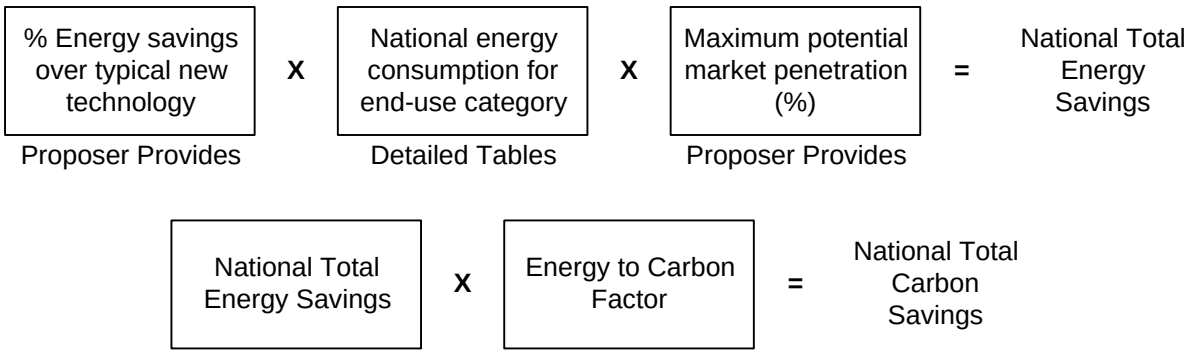
Building Technologies Program

Introduction

This guide provides a method for estimating the savings in primary energy consumption and carbon emissions that could result from projects in solid state lighting research and development (SSLR&D). The objective of creating this standardized estimation method is to facilitate comparison of a wide variety of SSLR&D applications on an equitable basis. This guide provides a simple calculation framework and some of the constants and baseline energy estimates to use for that calculation.

The method is applicable to lighting technologies for both residential and commercial buildings. The method can accommodate lighting technologies that are at the very early stages of development as well as well-characterized technologies in the midst of a development cycle. It may not provide an accurate forecast of the likely impact of any one specific technology, however, by creating a consistent framework for analysis, the method will enable comparability amongst applications.

The savings estimates are expressed in terms of an annual national energy savings rate, based on the maximum likely market penetration of the proposed technology. A straightforward calculation method accommodating most technologies and markets is illustrated below:



The method requires four basic data items to generate an estimate of both primary energy savings and carbon emission savings. Those items and their sources are:

Item #	Description	Source
1	Primary energy consumption of the end use(s) targeted	Attached tables A and B
2	Performance level of typical new lighting technology	Attached tables A and B
3	Performance level of proposed technology	Proposer provides and substantiates
4	Expected market penetration of proposed technology	Proposer provides and substantiates

Items 1 and 2 are provided by the Department in Tables A and B, covering residential and commercial installations, respectively. Table C provides data to convert energy savings into carbon emissions savings, along with selected conversion constants, to ensure consistency among the estimates. Items 3 and 4 are provided by the proposer and must have adequate supporting justification for the performance and expected market penetration.

The performance level (item 3) must be based on the attributes of the proposed technology and must be substantiated by appropriately detailed engineering or scientific analysis, simulation modeling, and/or literature references. Substantiating data are necessary to justify the performance level used. In some cases, the lighting technology proposed will be a sub-component of one of the elements listed in Tables A and B. Sub-component technologies will require some additional calculations to adjust baseline energy before applying the methodology. Example #2 deals with this situation. The methodology should be based on comparing the performance level of the proposed technology with the performance of the typical new technology currently used. In a replacement situation, it is implicitly assumed that replacement would occur regardless of the new technology. Therefore, the comparison is not based on the performance of the technology actually being replaced, but on the technology most likely to be used today.

The expected market penetration (item 4) is an estimate of the long-term penetration of the target market, on a percentage basis. The expected market penetration must be supported by a brief market analysis and/or supporting literature references. The brief market analysis must consider sector-specific economic factors (including expected first cost and payback period, relative to other technologies) and non-economic factors, which may limit the penetration of all of the target markets. (Non-economic factors include product physical size, building characteristics and institutional barriers.) A discussion of these factors may be necessary to justify the market penetration level used. It is possible to save energy with a technology that does not exceed the maximum efficiency available in the market, if the proposed technology has a lower first cost. The low-cost technology could create an incremental or additional market penetration above the present sales level for highly efficient products. This incremental market penetration would be used in calculating savings.

The savings calculation method outlined herein, if applied directly, may not accurately estimate the savings for certain technologies, such as crosscutting, integrated technologies, enabling products, or niche applications. For these special cases, the proposer may modify this methodology or create a comparable methodology, as long as the methodology provides an equivalent level of calculation transparency, contains adequate justification through supporting data, and is fully consistent with the data in Tables A through C. The savings should be presented in terms of an annual national rate at maximum market penetration, not cumulative savings over several years nor a savings rate at some future point in time. Applications for product development of enabling products should highlight the improvement in efficacy offered by their product compared to the incumbent product. For example, for a new phosphor system that enables the creation of an LED with 150 lumens per watt efficacy compared to a state of the art LED with a conventional phosphor that has an efficacy of 120 lumens per watt, the 20% improvement is what should be claimed. Enabling products should not claim the entire efficacy improvement over conventional lighting of the final products that they are enhancing (unless the enabling product is of such a critical nature that the SSL general illumination product would not exist without this technology). Another situation for an enabling product would be the enhancement of market share due to the application of their product to the SSL general illumination device. For example, an enabling product could improve OLED lifetime or reduce

the initial cost of an OLED luminaire. This would affect the market penetration of the OLED luminaire and therefore affect energy savings calculation.

Lighting Technologies

The approach for estimating the relative energy savings of lighting technologies is based on the on-going replacement of lighting equipment in the existing building stock. The current energy consumption characteristics of existing buildings (Tables A and B) are used as the baseline for market penetration and savings estimates. This method implicitly uses the following approximations:

- all lighting equipment in all current buildings will eventually be replaced with new equipment, either due to equipment failure, functional, or economic factors.

- over the next 20 years, replacement of lighting equipment in existing buildings will produce a much larger market for energy savings than installations in newly-constructed buildings.

Therefore, there is no need to attempt to forecast the energy consumption characteristics of building lighting equipment in the future. Nor is there a need to calculate energy savings potential in new construction. Sufficient differentiation with respect to energy savings potential can be determined using the energy use characteristics of existing buildings.

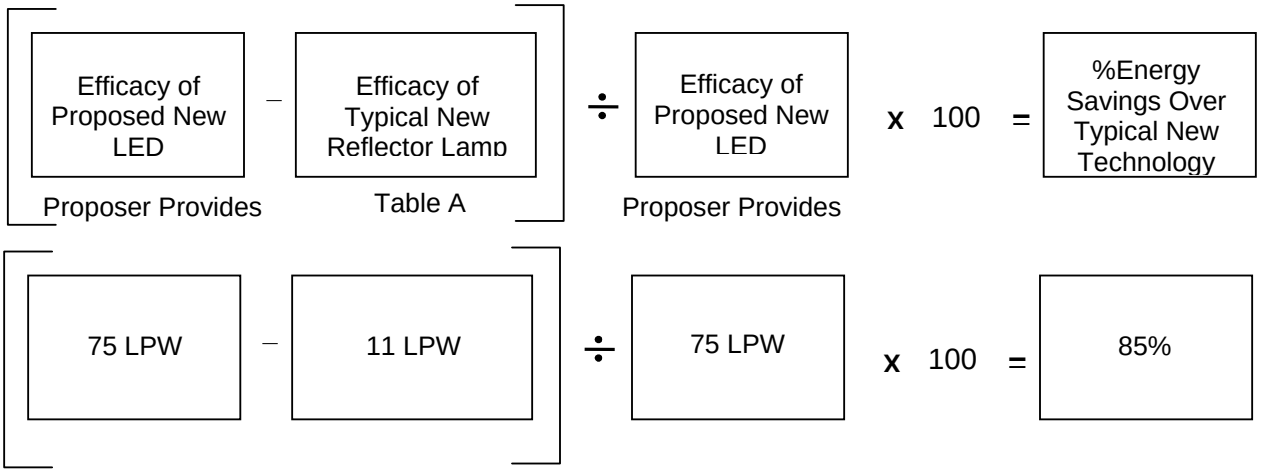
Example #1: This example deals with the development of a white-light LED designed to replace incandescent reflector lamps. The target market is both residential and commercial buildings. For the expected market penetration, the proposer estimates that 60% of the installed base of reflector lamps have the potential of being replaced by this new technology. This penetration level reflects the influence of several factors, including: the cost of electricity, the higher cost associated with this new technology, the sector-specific paybacks associated with this cost, and the number of applications into which it may be installed.

Example #2: This example considers the development of a white-light OLED device that is capable of replacing fluorescent lighting systems in commercial buildings. This is a system-to-system comparison, where a fluorescent system is replaced with an OLED fixture. The expected market penetration is 50% of the installed base, reflective of factors such as the operating and maintenance cost savings, and the sector-specific payback periods associated with the retail price of this product.

Example 1. White-Light LED Replacement for Incandescent

A newly developed, high-brightness, energy efficient, white-light LED is proposed to replace incandescent reflector lamps. From detailed engineering models based on laboratory results, the performance of these LEDs has been determined to be 75 lumens per watt. From market analyses, the maximum expected market penetration is 60% of the installed reflector lamp stock, limited primarily by the higher cost associated with this new technology, the sector-specific paybacks resulting from the energy savings, and the number of applications into which it may be installed. The efficacy and market penetration estimates were prepared by the proposer and have supporting documentation and data.

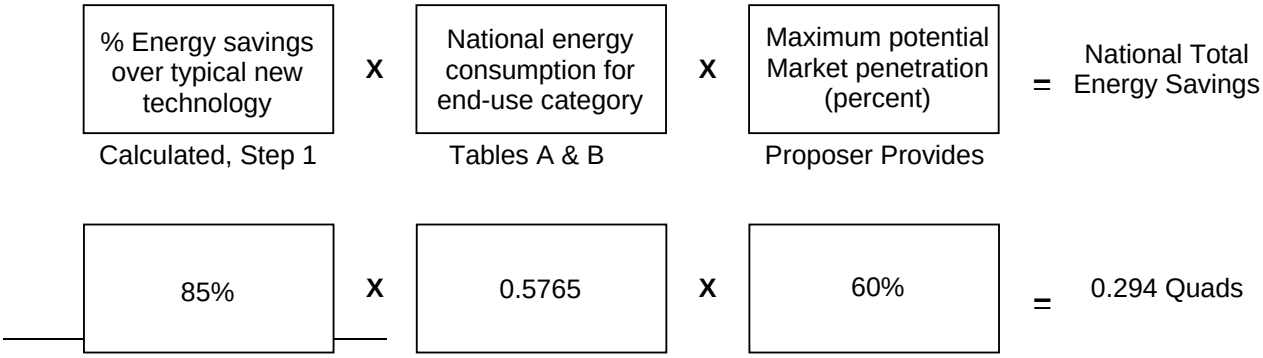
Step 1: Enter the efficacy of the proposed new white-light LED into two of the boxes. Look up the typical efficiency of a typical new reflector lamp in Table A[1] – 11 lumens per watt; this value is entered into the second box. Simple arithmetic provides the percent energy savings over a typical new reflector lamp as 85%.



Step 2: This technology is applicable to reflector lamp applications in both the residential and commercial sectors. Look up the energy consumption of reflector lamps in tables A and B: the residential sector consumes 0.2540 quads and the commercial sector consumes 0.3225 quads. In total then, the installed base of incandescent reflector lamps is estimated to consume approximately 0.5765 quads each year.

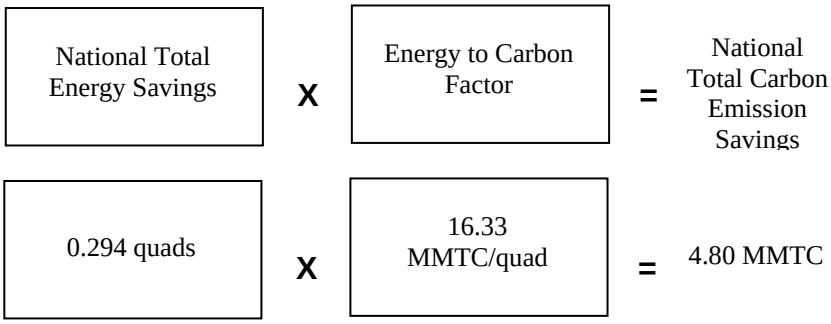
Step 3: Provide the value of the potential market penetration, estimated by the proposer. The estimate provided is 60%.

Step 4: Place the three values (85%, 0.5765 quads, and 60%) into the energy savings estimate equation boxes and multiply. The result is a national total annual energy savings of 0.294 quads due to this new, more energy efficient lighting technology.



[1] Tables A through C are located at the end of Section V.

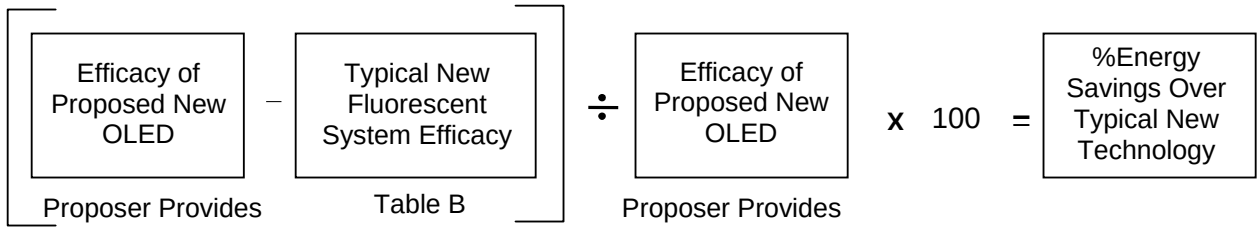
Step 5: To obtain the related carbon savings for the 0.294 quads, look up in Table C, the fuel-specific carbon emissions factor. The conversion value is 16.33 MMTC/quad (million metric tonnes carbon per quadrillion Btu). Insert the two values into the boxes, and multiply the energy savings by the conversion factor. The result is 4.80 million metric tonnes of carbon (MMTC) saved annually due to this new, energy efficient lighting technology.

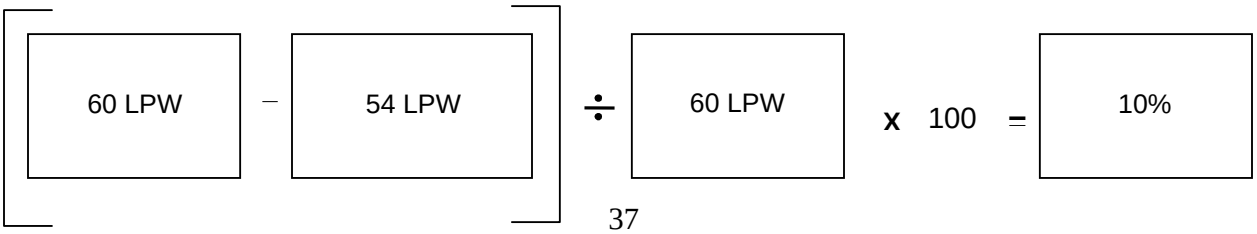


Example 2. OLED Replacement for Fluorescent Lighting Fixture

This example considers the development of a white-light OLED device that is capable of replacing fluorescent lighting systems in commercial buildings. This is an example of a system-to-system comparison, whereby a fluorescent fixture is replaced by a new fixture incorporating an OLED device. A fluorescent system efficacy is estimated in Table B to be approximately 54 lumens per watt, adjusting the fluorescent lamp efficacy for an assumed 80% fixture efficiency and an 85% ballast efficiency. The expected market penetration of this device is 20% of the installed base, reflective of factors such as the first cost, operating and maintenance cost savings, and the sector-specific payback periods. Proposer must provide supporting documentation and/or data on the estimate of penetration.

Step 1: From modeling and/or measurements of a white-light OLED device, the proposer establishes that the product has a system efficacy of 60 lumens per watt. Convert that performance into a % energy savings over typical new fluorescent systems. Compared to a typical new fluorescent system of 54 lumens per watt, the proposed OLED is 10% more efficient.





Step 2: Look up the energy consumption attributable to fluorescent lighting in Table B. The value is 2.23 quads, which accounts for all linear fluorescent lighting systems in commercial buildings.

Step 3: The proposer estimates the level of anticipated market penetration for the OLED system, estimated and substantiated by the proposer. The estimate provided is 20%.

Step 4: Place the above three values (10%, 2.23 quads, and 20%) into the provided boxes and multiply. The result is a national total energy savings of 0.045 quads.

% Energy savings over typical new technology		National energy consumption for end-use category		Maximum potential Market penetration (percent)	=	National Total Energy Savings
Calculated, Step 1		Tables A & B		Proposer Provides		
10%	X	2.23	X	20%	=	0.045 Quads

Step 5: To obtain the related carbon emission savings for the 0.045 quads, look up the appropriate generic carbon emissions factor in Table C. The conversion value is 16.33 MMTC/quad (million metric tonnes of carbon per quad of primary energy). Insert the two values into the boxes, and multiply the energy savings by the conversion factor. The result is a 0.73 million metric tonne reduction of carbon emissions.

National Total Energy Savings	X	Energy to Carbon Factor	=	National Total Carbon Savings
0.045 quads	X	16.33 MMTC/quad	=	0.73 MMTC

INPUT TABLES

Table A: Residential End-Use Primary Energy Consumption and Typical Efficiencies

Type of Lighting	Total Energy Use (quads)[2]	Typical New Source Efficacy (lumens per watt)[3]	Typical New System Efficacy (lumens per watt)[4]
Incandescent General Service	1.7054	15	12
Incandescent Reflector	0.2540	11	9
Halogen Lamps	0.0609	20	16
Fluorescent Lamps (excluding CFL)	0.2026	65	44
Compact Fluorescent Lamp	0.0115	55	37
Mercury Vapor	0.0061	40	22
High Pressure Sodium	0.0010	80	45

[2] Quads of energy, accounting for the primary energy consumed at the generating power plant, incorporating all the generation, transmission and distribution losses associated with the delivery of electricity to the light fixture on site.

[3] Efficacy (lumen per watt) values will vary by wattage within a given lamp type. Constant values are proposed for the energy savings calculation for comparability of applications.

[4] System efficacy represents the performance of the lamp, fixture and ballast/transformer (if necessary). Low voltage halogen transformers are assumed to be 90% efficient, fluorescent ballasts are assumed to be 85%, and HID ballasts are assumed to be 70%. For comparability of applications, fixture efficiency for all sources is assumed to be 80%, however the Department recognizes that fixture efficiencies vary with fixture size, shape, treatment, and application. For example, compact fluorescent lamps have typical luminaire efficiencies in the range of 30% to 70%, while luminaires using incandescent reflector lamps have efficiencies from 65% to more than 90%.

Table B: Commercial End-Use Primary Energy Consumption and Typical Efficiencies

Type of Lighting	Total Energy Use (quads)[2]	Typical New Source Efficacy (lumens per watt) [3]	Typical New System Efficacy (lumens per watt) [4]
Incandescent General Service	0.7497	15	12
Incandescent Reflector	0.3225	11	9
Halogen Lamps	0.1504	20	16
Halogen Reflector, Low Voltage	0.0779	13	9
Misc. Incandescent Low Wattage	0.0405	10	8
Fluorescent Linear Tube	2.2297	80	54
Compact Fluorescent Lamp	0.1054	60	41
Circline and Misc. Fluorescent	0.0347	60	41
Mercury Vapor	0.0703	50	28
Metal Halide	0.3648	70	39
High Pressure Sodium	0.0608	100	56
Low Pressure Sodium	0.0014	140	78

Table C: Electricity Prices and Conversion Factors

Item	Value	Units
Residential Electricity Price (2002)	0.084	$/kWh
Commercial Electricity Price (2002)	0.079	$/kWh
Fuel Specific Carbon Emission Factors		
Electricity (2001)	16.33	Million metric tonnes carbon per quad
Average delivered Utility Power (2001)	11,030	BTU/kWh

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